

Project Code and Title

B.01.13 Upgrade of Rollover Crash Protection

Project Objective

To improve crash survivability in rollover crashes by preventing occupant ejection and by mitigating the severity of impacts that an occupant experiences during rollover

Background

The National Highway Traffic Safety Administration Authorization Act of 1991 mandated that the agency initiate rulemaking on rollover protection. Subsequently, a rulemaking plan titled "Planning Document for Rollover Prevention and Injury Mitigation" was published for public review (Docket 91-68 No. 2, Sept 1992). This program identifies the current research activities in support of the crashworthiness programs in this document.

Problem Definition

On average, 7,797 annual rollover involved fatalities were reported by the Fatal Accident Reporting System, FARS, between 1988 and 1994. There were also between 43,000 and 58,000 annual rollover involved incapacitating injuries between 1988 and 1994, as reported by NASS GES. Approximately 16 percent of serious injuries to passenger car occupants and 42 percent of serious injuries to light truck occupants occurred in vehicles that rolled over. Light trucks, including vans, experienced the highest rollover involvement rate, 25.9 percent, compared to 15.3 percent for passenger cars.

Approximately 59 percent of the rollover fatalities come from the 10 percent of the rollover involved occupants who are ejected, partially or completely, from the vehicle. Of the fatal ejections, 56 percent are ejected through side glazing and 13.9 percent are ejected through side doors. Belt use is a significant factor in ejection, 92 percent of the fatal ejections reported in FARS between 1988 and 1994 were unbelted.

Research Approach

Rollover accidents have a wide variety of accident types and injury mechanisms. This research program integrates many different aspects of rollover protection. Countermeasures involving upper interior padding, improved restraints, alternative side window materials, improved door latches, and upgraded roof strength requirements are being studied. Some of these countermeasures are being addressed in separate research programs, but still achieve significant benefits for rollover accidents. Ejections through door latches are being addressed

in B.01.04, ejections through side windows are being researched in B.01.05, and the research under B.01.06 will evaluate the rollover benefits of upper interior padding.

The wide variety of accident types and injury mechanisms makes it impractical to define a single test or a series of tests that can reasonably assess a vehicle's rollover crashworthiness. This program will use the previous full scale crash tests to establish a baseline for computer simulations. These simulations will be used to evaluate injury causation mechanisms and possible countermeasures for a variety of rollover environments. Promising countermeasures will be developed into prototype systems that can be tested in component or full scale crash test environments. A long range procedure for possibly upgrading FMVSS No. 216 is under development.

Potential Impact/Application

Multiple safety standards may be modified as a result of this research. A potential procedure for FMVSS 216 is being developed. Also research procedures are being developed for FMVSS's 205 and 206.

Key Milestones

- ▶ Alternative Glazing - Rulemaking Decision May 1988
- ▶ Side Door Latches - ANPRM Fall 1996
- ▶ Roof Crush Research - Summary report expected Fall/Winter 1996
- ▶ Rollover Restraints - Preliminary research Report due, Fall 1997

RESOURCE REQUIREMENTS	FY96	FY97	FY98	FY	FY
Contract Money (\$K)	500	400	400		

Project Manager(s)

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Completion Date

December 1999

Publications

- 1 Summers, Rains, Willke, "Current Research in Rollover and Occupant Retention", 17th ESV Conference, Melbourne Australia, Spring 1996
- 2 Pioneer Engineering and Manufacturing Co. "Design Modification for a 1989 Nissan Pickup", DOT HS 807 925, September 1991

Keywords: Rollover, Ejection, Roof Crush

Project Tasks

<u>Task</u>	<u>Title and Description</u>
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Task 1	Problem Determination
Task 2	Improved Door Latches
Task 3	Improved Glazing
Task 4	Improved Interior Padding
Task 5	Computer Studies
Task 6	Develop Component Level Test Procedures
Task 7	Crash Tests - Roof Crush
Task 8	Interior Contact and Restraints
Task 9	Rulemaking Support

Task	Start Date	Projected Completion Date	Status/Responsibility
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1	1/91	9/96	Initial work Complete, but ongoing requirement
2			(See B.01.04)
3			(See B.01.05)
4			(See B.01.06)
5	1/91	11/96	Ongoing
6	3/91	12/96	in progress
7	5/91	1/95	complete
8	9/95	9/97	in progress
9	1/91		ongoing

Supporting Contracts

Task	Contract Number	COTR (phone)	Contracting Officer (phone)	Total Contract Cost (\$K)
1	DTFH61-92-C-00128	Len Meczowski (703)285-2420		75